Key Curriculum Press
Discovering Geometry, Geometry

Degree of Evidence regarding the Standards for Mathematical Practice:

Moderate Evidence

Summary of evidence:

1. **Make sense of problems and persevere in solving them**. In the chapters reviewed, there are numerous opportunities for students to analyze the mathematics and to explain their findings, mainly within the lesson activities and investigations. There are several opportunities to explain answers in the problems (e.g. p. 561 #20, 21, 22). Many open-ended questions are presented both as investigations and as practice problems (e.g. p. 549 #13). Exposure to a variety of representations is present, including models, equations, tables, etc. Based on the Investigations completed in cooperative learning groups, there are frequent opportunities for self and peer revision. Overall there are frequent open-ended problem-solving opportunities for students as they discover the concepts for themselves. There is frequent opportunity for students to create a problem-solving plan and to carry it out, checking their results for accuracy.
2. **Reason abstractly and quantitatively**. Application problems are presented throughout the text. Students are frequently asked to create and work with a model for the problem situation. For example, within the unit on solids, students work with nets, isometric drawings, and 3-D. In the chapters reviewed, students are frequently, if not always, led to derive the formulas through investigations and then to represent their findings using symbolic notation. Units are used throughout the text in all problems. Students work with both exact values and decimal approximations. There are numerous application problems or examples spread throughout each unit. Questions are geared towards students discovering the algorithm for the mathematics or the formula on their own or in groups, rather than just being presented with the formula from the start.
3. **Construct viable arguments and critique the reasoning of others**. The opportunities for students to explain their reasoning are primarily in the investigations of each section. Many practice problems, though, require students to explain a geometric truth or to justify their answer (e.g. p. 495 #23, p. 494 #11). In the teacher resource, there is a "Sharing Ideas" section for every lesson that suggests possible questions to help facilitate discussion among the students (e.g. ex. p. 532). There are frequent instructions for students to share their methods and results (e.g. p. 485 step 6, p. 491 step 3, p. 492 step 3). The teacher could then facilitate a class discussion about the results. Discussions of justification are limited in the chapters reviewed. Opportunities for students to justify their thinking are available throughout the text. Overall, this text provides ways to incorporate the critiquing of the reasoning of others, but will rely some on teacher facilitation of the investigations.
4. **Model with Mathematics**. In the chapters reviewed, students are frequently asked to create mathematical models. Projects included throughout the text also encourage students to create models as well as to make connections between prior knowledge and new knowledge (e.g. p. 402, p. 433, p. 543) In the application questions, answers are in context. As students progress in their understanding of the concept covered in the lesson, they continue to build the connection among tables, equations, and situations. There are frequent opportunities for students to create and work with models while grappling with the concepts they are asked to discover on their own. Students move from the models to the symbolic representations or formulas they have conjectured and tested on their own.
5. **Use appropriate tools strategically.** Geometric constructions are presented throughout the text.

Constructions are used as a tool to explore geometric concepts rather than as a separate concept of its own. Students are asked to use rulers, protractors, patty paper, 3-d models, nets, and so on within investigations and practice problems. There are opportunities to use graphing calculators for concepts other than trigonometry. There are also opportunities to use the graphing calculator to make algebraic connections for geometric relationships (e.g. p.554 project for maximizing volume). There is mention about using geometric computer software to aid in student understanding, both in investigations and practice problems (e.g. p. 262 investigation, p. 354 #24, p. 561 #21, 22). Interactive sketches are provided at the on-line website for students to access without the computer software. In the chapters reviewed, no evidence was found regarding the evaluation of the strength and weaknesses of certain tools with respect to the problem scenario.

6. **Attend to precision.** Examples use proper notation and are precise. Students are asked to round to various decimal places. In the chapters reviewed, the importance of precise communication is mainly presented in the teacher resource under the "Sharing Ideas" section. There are some problems where students are asked to conduct error analysis to correct misconceptions presented in a particular solution or statement. Often the issue is that the writer is too vague in their answer, pulling in the opportunity to practice using precise and clear communication. Students are given opportunities to share their solutions and compare their findings within their cooperative learning groups. Overall, there is attention to precision in the examples, but with the opportunity for students to discuss during the investigations if implemented by the teacher.
7. **Look for and make use of structure**. In the chapters reviewed, there are frequent opportunities for students to look at examples and then generalize the mathematics. Students almost always discover the mathematical rule for themselves through the investigations. Students then complete the rule or formula. The formula is not already printed in the book for them. Most activities explore patterns to create generalizations. Students are continually asked to activate their prior knowledge to tackle new problems or conjectures (e.g. p. 297 #32 asks students to use vectors, learned in a previous section).
8. **Look for and express regularity in repeated reasoning.** In the chapters reviewed, there are frequent examples where the resource asks students to look at patterns and to compare their findings with others in order to arrive at a generalization. Questions lead students to develop formulas for themselves. For example, students derive all the volume formulas on their own through the work they complete in the chapter on volume. Students complete investigations to determine shortcuts (e.g. Congruent Triangles on pp. 221-223 and 227-228). Overall, there are frequent opportunities for students to generalize a pattern to determine a rule. The whole structure of the text is for students to discover the geometric truths on their own through investigations where they are asked to generalize their findings.